Arthropoda Selecta 15 (2): 99–117

New species of the lithobiid genus *Lithobius* (*Monotarsobius*) (Chilopoda: Lithobiomorpha: Lithobiidae) from eastern Kazakhstan

Новые виды костянок рода *Lithobius (Monotarsobius)* (Chilopoda: Lithobiomorpha: Lithobiidae) из Восточного Казахстана

G.Sh. Farzalieva
Г.Ш. Фарзалиева

Department of Zoology, Perm State University, Bukireva 16, Perm 614990 Russia. E–mail: fgsh@psu.ru
Кафедра зоологии беспозвоночных и водной экологии, Пермский государственный университет, Букирева 16, Пермь 614990 Россия.

KEY WORDS: Lithobiidae, taxonomy, *Lithobius (Monotarsobius),* new species, East Kazakhstan.

КЛЮЧЕВЫЕ СЛОВА: Lithobiidae, систематика, *Lithobius (Monotarsobius)*, новые виды, Восточный Казахстан.

ABSTRACT. Eight new species of the centipede genus *Lithobius* (*Monotarsobius*) are described from eastern Kazakhstan: *L. ketmenensis* sp.n. from Ketmen Mountains, *L. amplinus* sp.n. from Charyn River Canyon, *L. canaricolor* sp.n., *L. minimus* sp.n., *L. simplis* sp.n. and *L. tuberofemoratus* sp.n. from Dzhungarsky Alatau Mountains, *L. tarbagataicus* sp.n. from Tarbagatay Mountains, *L. insolitus* sp.n. from Tarbagatay and Dzhungarsky Alatau Mountains, as well as from near Lake Zaysan.

РЕЗЮМЕ. Описаны восемь новых видов костянок рода *Lithobius* (*Monotarsobius*) из Восточного Казахстана: *L. ketmenensis* sp.n. с горы Кетмень, *L. amplinus* sp.n. из ущелья реки Чарын, *L. canaricolor* sp.n., *L. minimus* sp.n., *L. simplis* sp.n. и *L. tuberofemoratus* sp.n. из Джунгарского Алатау, *L. tarbagataicus* sp.n. из Тарбагатая, *L. insolitus* sp.n. из Тарбагатая и Джунгарского Алатау, а также из окрестностей озера Зайсан.

Introduction

The lithobiomorph fauna of eastern Kazakhstan, Central Asia, has hitherto been known to contain only three species: *Hessebius perelae* Zalesskaja, 1978, *Lithobius loricatus* Sseliwanoff, 1881 [Zalesskaja, 1978; Farzalieva, Zalesskaya, 2003] and the recently described *Dzhungaria gigantea* Farzalieva, Zalesskaja et Edgecombe, 2005 [Farzalieva et al., 2005].

The present paper is mainly based on material taken in 2001 by S.I. Golovatch (SIG in the text) in eastern Kazakhstan. As many as eight species of *Lithobius* (*Monotarsobius*) are described here as new. Type material is largely deposited in the collection of the Zoological Museum of the Moscow State University (ZMUM), with a few para- and/or non-types housed in the collection of the Perm State University (PSU).

The following abbreviations are used in the text: D — dorsal, V — ventral, C — coxa, Tr — trochanter, P — prefemur, F — femur, T — tibia, a — anterior, m — median, p — posterior. In the tables referring to holotypes, spines shown in brackets mean their asymmetric position, whereas in the tables referring to the paratypes the same means their presence only in some of the specimens. All measurements are given in mm.

Taxonomic part

Lithobius (Monotarsobius) ketmenensis **sp.n.**
Figs 1–16.

Holotype ♂ (ZMUM), Eastern Kazakhstan, Almaty Area, Uigursky Distr., 5 km SE Kyrgyzsai (= Podgornoe), Ketmen Mts, 1500–1900 m a.s.l., 43°17'N, 79°31'E, *Picea, Betula, Populus* etc. forest, 01–02.VI.2001, leg. SIG.

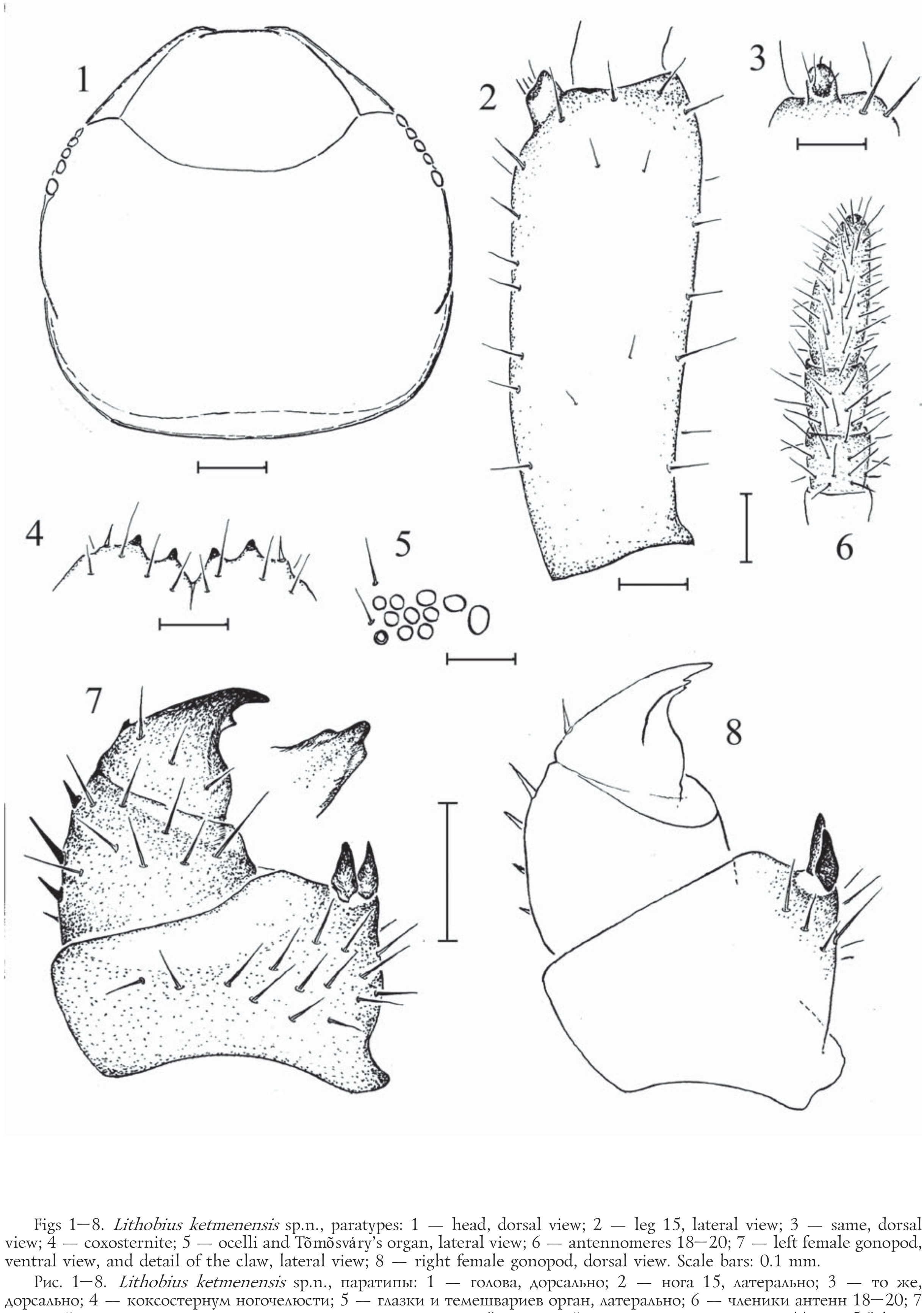
Paratypes: 31 ♂♂, 27 ♀♀ (ZMUM), 2 ♂♂, 2 ♀♀ (PSU), same data as holotype.

NAME. To emphasize the terra typica.

DIAGNOSIS. The new species is characterised by the peculiar dorsolateral armature of the female gonopod, the presence of several long setae on the internal face of the female gonopod and the armature of the male 15 wart.

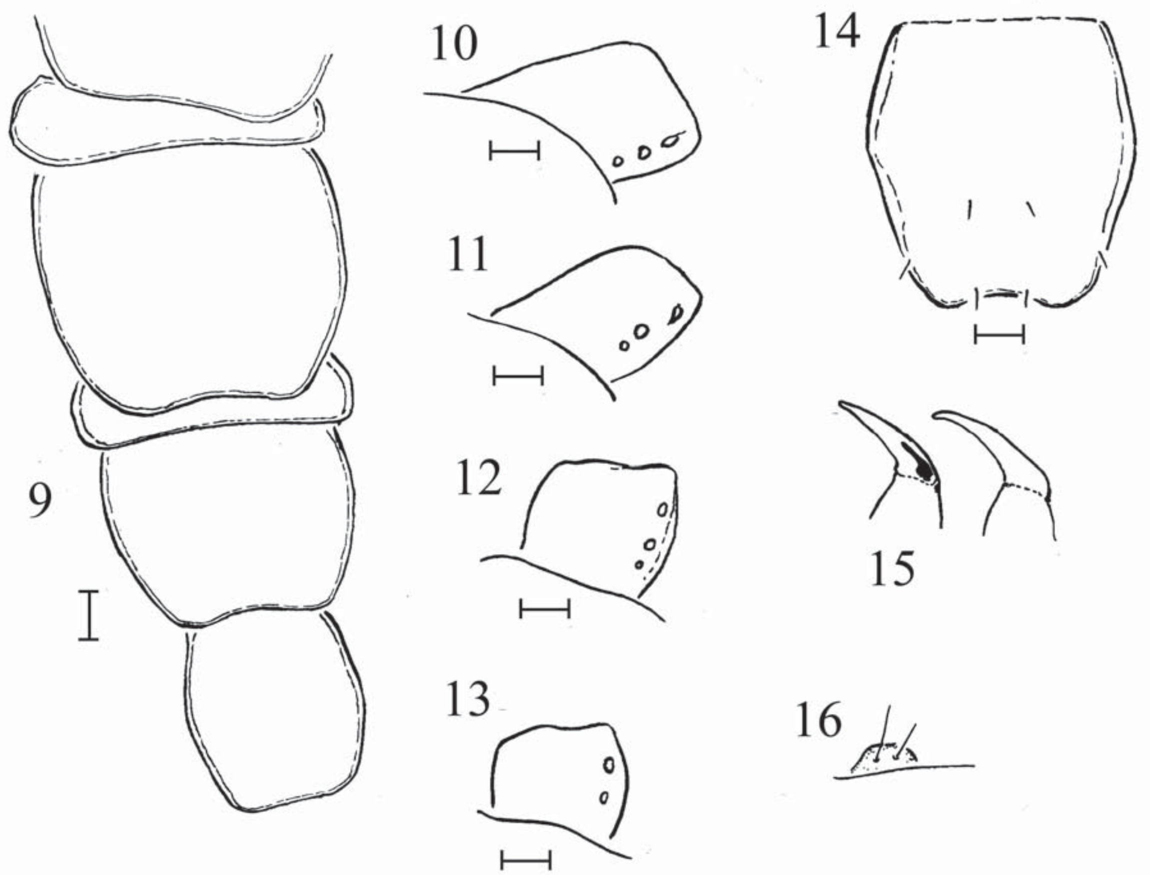
DESCRIPTION. Holotype. Body 10.9 long, brown. All tergites with rounded posterior corners, macrotergites poorly emarginate (Fig. 9); terminal tergite slightly elongate, slightly emarginate at caudal margin, length to breadth ratio 1.1:1 (Fig. 14). Head broadened, length to breadth ratio 0.9:1; median notch well-expressed (Fig. 1). Head a little broader than tergite I, ratio 1.2:1.

Antennae about 2–2.5 times as long as head, with 20 antennomeres covered with dense, light, erect sensilla (Fig. 6). Length to breadth ratio of terminal antennomere 2.5:1.



Figs 1—8. *Lithobius ketmenensis* sp.n., paratypes: 1 — head, dorsal view; 2 — leg 15, lateral view; 3 — same, dorsal view; 4 — coxosternite; 5 — ocelli and Tõmõsváry's organ, lateral view; 6 — antennomeres 18—20; 7 — left female gonopod, ventral view, and detail of the claw, lateral view; 8 — right female gonopod, dorsal view. Scale bars: 0.1 mm.

Рис. 1—8. *Lithobius ketmenensis* sp.n., паратипы: 1 — голова, дорсально; 2 — нога 15, латерально; 3 — то же, дорсально; 4 — коксостернум ногочелюсти; 5 — глазки и темешвариев орган, латерально; 6 — членики антенн 18—20; 7 — левый гонопод самки вентрально и часть когтя, латерально; 8 — правый гонопод самки, дорсально. Масштаб 0,1 мм.



Figs 9—16. *Lithobius ketmenensis* sp.n., paratypes: 9 — female tergites XI—XVI, dorsal view; 10—13 — coxae 15—12, ventral view; 14 — terminal tergite of male, dorsal view; 15 — legs 14 and 15, lateral view; 16 — male gonopod, ventral view. Scale bars: 0.1 mm.

Рис. 8—16. *Lithobius ketmenensis* sp.n., паратипы: 9 — тергиты самки XI—XVI, дорсально; 10—13 — тазики 15—12, вентрально; 14 — терминальный тергит самца, дорсально; 15 — ноги 14 и 15, латерально; 16 — гонопод самца, вентрально. Масштаб 0,1 мм.

Ocelli: 10 on each side in three rows: dorsal row with four and one light placed apart, middle row with three, ventral row with two dark ocelli; Tőmősváry's organ as large as nearest ocelli, rounded (Fig. 5).

Coxosternite with 2+2 acute teeth and well-expressed porodonts on small knobs, porodonts shorter than to about as long as external teeth; lateral sides of coxosternite convexly rounded. Medium cut deep (Fig. 4).

Legs 1–12 with clearly unipartite tarsi; legs 12–15 with coxolateral spines. Legs 1–14 each with one true accessory posterior claw (in addition, legs 11–13 each with a near-claw seta similar in shape to accessory claw), leg 15 without accessory claw. Claws of legs 14 & 15 as in Fig. 15; leg spinulation as in Tab. 1. Legs 14 & 15 incrassate, tibia 15 with a distodorsal, elongate wart with a crater at apex, surrounded by 3–5 very thin and light setae (Figs 2 & 3).

Coxal pores on legs 12–15 small, rounded, separated from one another by distances 1–1.7 times greater than their own diameter; formula 2333 (Figs 10–13). Gonopod 1-segmented, oblique apically, with two setae placed at gonopod middle (Fig. 16).

Male variation. Body 10.8 (10.3–11.5) long. Length to breadth ratio of terminal tergite 1.1–1.2:1. Antennae with 19–21 antennomeres, length to breadth ratio of terminal antennomere 2.4–2.9:1. Ocelli: 9–11. Coxolateral spines always developed on legs 13–15, sometimes absent from legs 11–12; leg spinulation as in Tab. 1. Number of coxal pores: 2,3,3(4),3. Gonopod with two (rarely one) setae.

Female. Body 10.8 (9.7–11.8) long. Diagnostic characters and leg spinulation as in male, but terminal tergite straight at caudal border, as long as wide (Fig. 9); number of coxal pores: 3443, sometimes 2343.

Gonopods with 2–3 long setae on internal face (Fig. 8), with 2+2 conical spurs separated from one another by less than their diameter at base; claw tridentate. Gonopod segment I without spines, II with 3–4, III with a single dorsal spine (Figs 7 & 8). Claw can be pointed to varying degrees: both internal and middle teeth well-developed, external tooth mostly very small, poorly visible, in some specimens even obliterate.

REMARKS. This new species is to be compared with, and assigned among, the species of the group which Zalesskaja [1978] delineated as showing several very similar secondary sexual characters of the male. This group includes the Caucasian and Central Asian *L. turkestanicus* Attems, 1904, the East European *L. sseliwanoffi* Garbowski, 1897, as well as the Central Asian *L. ferganensis* Trotzina, 1894

Table 1. Spinulation of *L. ketmenensis* sp.n.
Таблица 1. Распределение шипов на ногах *L. ketmenensis* sp.n.

Leg pairs	V					D				
	Holotype									
	C	Tr	P	F	T	C	Tr	P	F	T
1	–	–	p	am	m	–	–	p	a p	a
2	–	–	p	am	m	–	–	p	a p	a p
3–5	–	–	p	am	am	–	–	(a) p	a p	a p
6–9	–	–	p	amp	am	–	–	a p	a p	a p
10–11	–	–	mp	amp	am	–	–	a p	a p	a p
12	–	–	mp	amp	am	a	–	amp	p	a p
13	–	–	amp	amp	am	a	–	amp	p	p
14	–	m	amp	am	m	a	–	amp	p	p
15	–	m	amp	am	–	a	–	amp	p	–
Paratypes										
1	–	–	p	am(p)	m	–	–	p	a p	a
2	–	–	p	am(p)	(a)m	–	–	p	a p	a p
3	–	–	(m)p	am(p)	(a)m	–	–	p	a p	a p
4–5	–	–	(m)p	amp	am	–	–	(a) p	a p	a p
6	–	–	(m)p	amp	am			a p	a p	a p
7–9	–	–	(m)p	amp	am	–	–	a p	a p	a p
10	–	–	(m)p	amp	am	–	–	a(m)p	a p	a p
11	–	–	mp	amp	am	(a)	–	a p	a p	a p
12	–	–	mp	amp	am	(a)	–	amp	p	a p
13	–	–	amp	amp	am	a	–	amp	p	p
14	–	m	amp	am(p)	(a)m	a	–	amp	p	p
15	–	m	amp	am	–	a	–	amp	p	–

and *L. javanicus* (Zalesskaja, 1978) (the latter **comb.n.** ex *Monotarsobius*). They all differ in claw structure and in the dorsolateral armature of the female gonopod, the special conformation of the protuberance of male tibia 15, as well as in details of leg spinulation. Based on these observations, we follow Zalesskaja [1978] in accepting their validity, contrary to Eason [1997: 120] who regarded the former two species as synonyms of the strongly variable *L. ferganensis*: "Characters such as the exact shape of the male 15 tibial protuberance, the shape of the claw and the size and the arrangement of the dorsolateral setae of the female gonopod and the details of the spinulation of the legs… are not co-ordinate with one another, sometimes differing in examples from the same population, and rarely showing the same combinations."

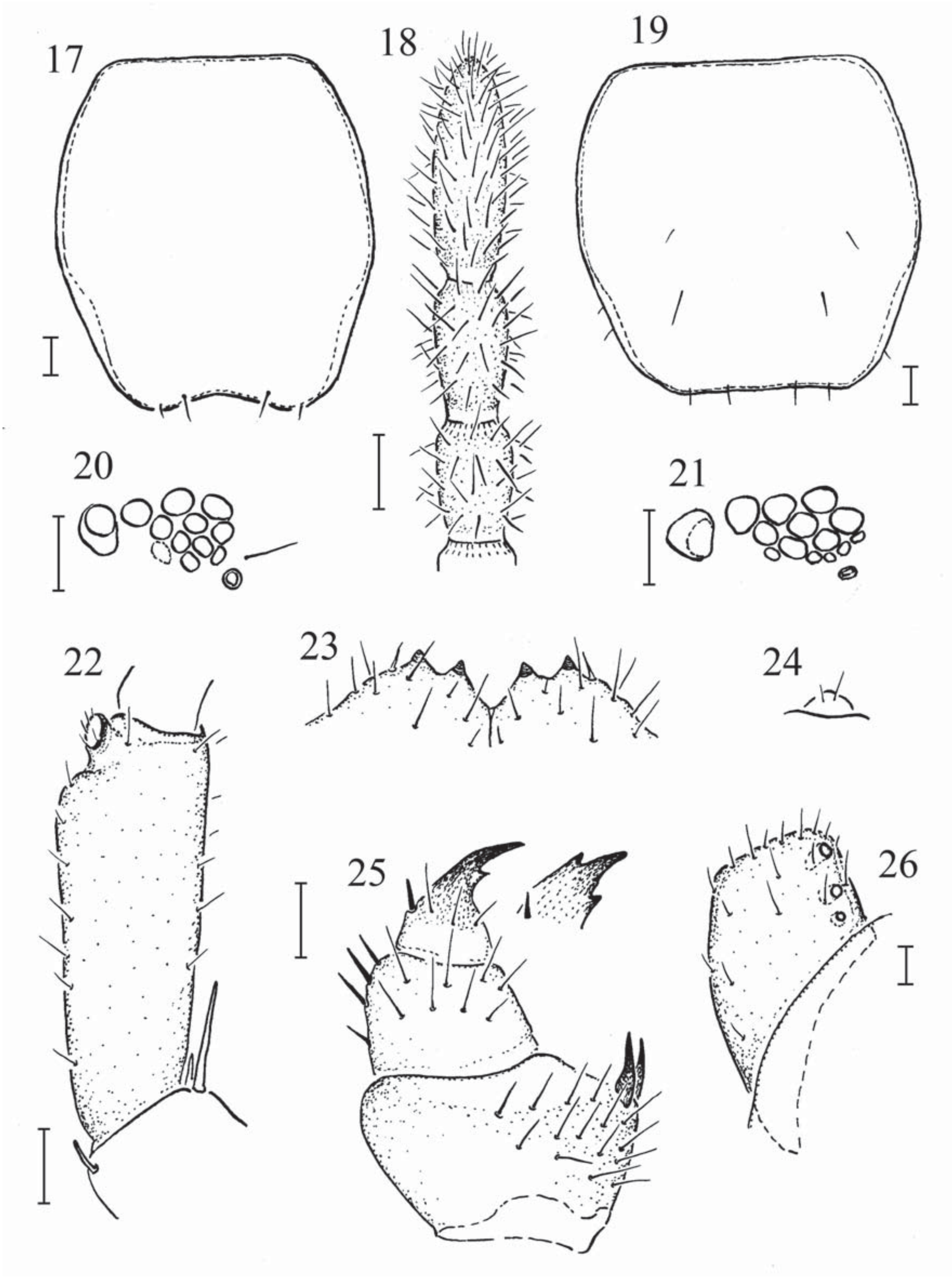
Based on both sexes, the new species seems to be especially similar to *L. turkestanicus* [Zalesskaja, 1978: 165 & 166], but is distinguished in the larger body (10.3–11.5 versus 8–9 mm in *L. turkestanicus*), a different pattern of spinulation of legs 1–11 (1–11 DP and 1–10 VP almost always without spines in *L. turkestanicus*), the presence of setae on the wart of male leg 15 and of 2–3 setae on the internal face of the female gonopod. This new species is also similar to *L. sseliwanoffi* [Zalesskaja, 1978: 164 & 165], based on body length, the structure of the coxosternite, the number and shape of coxal pores, the presence of 3–7 setae on the wart of male leg 15, but it differs considerably in structure of the female gonopod (segment I always with a single, large, distodorsal seta, segment II with 3–5, segment III with 3–4 short dorsal setae in *L. sseliwanoffi*), the presence of a crater on top of the wart of male leg 15 and of coxolateral spines on legs 12–15 (only on legs 14–15 in *L. sseliwanoffi*), the spinulation of legs 14 & 15 (14 DCaPmpF(p), 15 DcaPmp in *L. sseliwanoffi*). *L. ketmenensis* sp.n. is likewise similar to *L. ferganensis* [Zalesskaja, 1978: p. 162-163] in body length, the number of ocelli, in structure of the coxosternite and of the wart of male leg 15, in ventral leg spinulation, but it differs in the number of coxal pores (1222–2222 in *L. ferganensis*), in the dorsal spinulation of legs 14 and 15 (14 DCaPampFp, 15 DCaPamp), in structure of the female gonopod (with bidentate claws and only two dorsal spines on segment II in *L. ferganensis*). *L. ketmenensis* sp.n. is also rather similar to *L. javanicus* [Zalesskaja, 1978: 159 & 160], based on leg spinulation and the structure of the wart of male leg 15, but it differs by the number of ocelli and the size of Tõmõsváry's organ (4–5 weakly pigmented ocelli; Tõmõsváry's organ large, more than adjoining ocelli in *L. javanicus*), the presence of 1–2 setae on the male gonopod (1-segmented, without setae in *L. javanicus*) and the tridentate claw of the female gonopod (a narrow, strongly curved but simple claw in *L. javanicus*).

DISTRIBUTION. Only the terra typica. The Ketmen Mountains are an isolated, ancient and relict ridge lying between the Tien-Shan and Dzhungarsky Alatau mountains. They still support scattered woodlands, especially so at higher elevations, but at present the mountains are completely surrounded by arid steppe to semi-desert terrain. The profound isolation and geological age of Ketmen Mountains seem to account for several millipedes [Golovatch & Wytwer, 2003], all still to be described, as well as the above new lithobiid apparently being endemic there.

Lithobius (Monotarsobius) amplinus **sp.n.**
Figs 17–26.

Holotype ♂ (ZMUM), Eastern Kazakhstan, Almaty Area, Uigursky Distr., 11 km NW Chunja, Charyn River Canyon, 650 m a.s.l., 43°37'N, 79°20'E, old riverine *Fraxinus, Populus, Salix* etc. forest, 29—31.V.2001, leg. SIG.

Paratypes: 5 ♂♂, 9 ♀♀ (ZMUM), 1 ♂, 2 ♀♀ (PSU), same data as holotype.



Figs 17–26. *Lithibius amplinus* sp.n., holotype: 22 — male tibia 15, dorsolateral view; paratypes: 17 — terminal tergite of male, dorsal view; 18 — last three antennomeres; 19 — terminal tergite of female, dorsal view; 20 & 21 — female and male ocelli with Tõmõsváry's organ, respectively, lateral view; 23 — coxosternite; 24 — male gonopod, ventral view; 25 — left female gonopod, ventral view, and detail of the claw, lateral view; 26 — male coxa 15, ventral view. Scale bars: 0.1 mm.

Рис. 17–26. *Lithibius amplinus* sp.n., Голотип: 22 — голень 15 самца, дорсолатерально; паратипы: 17 — терминальный тергит самца, дорсально; 18 — три последних членика антенны; 19 — терминальный тергит самки, дорсально; 20–21 — соответственно глазки с темешвариевым органом самки и самца, латерально; 23 — коксостернум ногочелюсти; 24 — гонопод самца, вентрально; 25 — левый гонопод самки, вентрально, и часть когтя, латерально; 26 — тазик 15 самца, вентрально. Масштаб 0,1 мм.

Table 2. Spinulation of *L. amplinus* sp.n.
Таблица 2. Распределение шипов на ногах *L. amplinus* sp.n.

Leg pairs	V					D				
	C	Tr	P	F	T	C	Tr	P	F	T
Holotype										
1	–	–	mp	am	am	–	–	a p	a p	a
2–8	–	–	mp	amp	am	–	–	a p	a p	a p
9–11	–	–	mp	amp	am	–	–	amp	a p	a p
12	–	–	amp	amp	am	a	–	amp	p	p
13	–	(m)	amp	amp	am	a	–	amp	p	p
14	–	m	amp	amp	am	a	–	amp	p	p
15	–	m	amp	am	a	a	–	amp	p	–
Paratypes										
1	–	–	p	am(p)	(a)m	–	–	a p	a p	a
2	–	–	p	am	m	–	–	a(m)p	a p	a p
3	–	–	(m)p	am	am	–	–	a(m)p	a (p)	a p
4	–	–	mp	amp	am	–	–	a(m)p	a p	a p
5–11	–	–	mp	amp	am	–	–	a(m)p	a p	a p
12	–	–	amp	amp	am	(a)	–	amp	p	a p
13	–	(m)	amp	amp	am	a	–	amp	p	p
14	–	m	amp	amp	am	a	–	amp	p	p
15	–	m	amp	am	a	a	–	amp	p	–

NAME. To emphasize the large size.

DIAGNOSIS. The new species is characterised by the bipartite tarsi starting from leg 5 to 8.

DESCRIPTION. Holotype. Body 13.3 long, brown. All tergites with rounded caudal corners, macrotergites slightly emarginate caudally; length to breadth ratio of terminal tergite 1.1:1 (Fig. 17). Head broadened, length to breadth ratio 0.9:1; median notch well-developed. Head broader than tergite I, ratio 1.3:1.

Antennae about 2–2.5 times as long as head, with 20 longitudinal antennomeres covered with dense and light sensilla (Fig. 18). Length to breadth ratio of terminal antennomere 2.5:1. Ocelli: 13 on each side in 3–4 rows; Tõmõsváry's organ as large as nearest ocellus, rounded (Figs 20 & 21).

Coxosternite with 2+2 acute teeth and well-expressed porodonts, latter a little longer than external teeth, lateral sides of coxosternite gently sloping; medium cut deep and wide (Fig. 23).

Legs 1–7 with unipartite, legs 8–15 with bipartite tarsi. Legs 13–15 with coxolateral spines; legs 1–14 with accessory claws, leg 15 without accessory claw. Leg spinulation as in Tab. 2. Tibia 15 with a dorsolateral wart carrying a crater at apex and surrounded by thin short setae; wart placed inside a sharp ventroproximal emargination (Fig. 22).

Coxal pores on legs 12–15 small, rounded, separated from one another by distances 1.5–2 times greater than their own diameter; formula 3,4,3(4),3, coxa 15 as in Fig. 26. Gonopod 1-segmented, conical, with two setae placed at gonopod middle (Fig. 24).

Male variation. Body 13.1 (12.0–14.3) long. Length to breadth ratio of terminal tergite 1.1–1.2:1. Ratio of head and tergite I: 1.3–1.4:1. Antennae with 20–23 antennomeres, length to breadth ratio of terminal antennomere 2.5–3.0:1. Ocelli: 12–15. Number of coxal pores: 3,3(4),3(4),3.

Female. Body 14.1 (12.7–15.7) long. Diagnostic characters and leg spinulation as in male, but terminal tergite with a straight caudal edge, as long as wide (Fig. 19); number of coxal pores: 3(4),4,4,3(4).

Gonopods without setae on internal face, with 2+2 slender lanceolate spurs, latter spaced not greater than spur diameter at base. Segment I without spines, II with 3–4, III with a single dorsal spine. Gonopod claw long, tridentate, with acute teeth (Fig. 25).

REMARKS. The new species is extremely similar to *L. ketmenensis* sp.n. by its main characteristics. The differences concern the greater number of antennomeres and ocelli, the wider and deeper median cut of the coxosternite, the presence of 15VTa, and the elongate shape and longer claws of the female gonopods. Based on both sexes, *L. amplinus* sp.n. is similar to *L. turkestanicus* [Zalesskaja, 1978: 165 & 166], but differs in leg spinulation (almost always 1–11 DP and 1–10 VP without spines in *L. turkestanicus*) and the presence of setae on the wart of male tibia 15. This new species is also similar to *L. sseliwanoffi* [Zalesskaja, 1978: 164 & 165] in structure of the coxosternite, the number of coxal pores, the presence of 3–7 setae on the wart of male tibia 15, but differs considerably in structure of the female gonopod (segment I always with a single distodorsal spine, segment II with 3–5, segment III with 3–4 short dorsal spines in *L. sseliwanoffi*), the presence of a crater on top of the wart of male tibia 15, and in spinulation patterns of legs 14 and 15 (14 DCaPmpF(p), 15 DCaPmp in *L. sseliwanoffi*). *L. amplinus* sp.n. resembles *L. ferganensis* [Zalesskaja, 1978: 162 & 163] in the number of ocelli, the structure of the coxosternite, in ventral leg spinulation, the wart structure of male tibia 15, but it differs in the number of coxal pores (1222–2222 in *L. ferganensis*), in the dorsal spinulation of legs 14 and 15 (14 DCaPampFp, 15 DcaPamp in *L. ferganensis*), and in structure of the female gonopod (bidentate claws and only two dorsal spines on segment II in *L. ferganensis*). It is also similar to *L. javanicus* [Zalesskaja, 1978: 159 & 160] in leg spinulation, in structure of the male tibial 15 wart, but distinguished by the number of ocelli and the size of Tõmõsváry's organ (4–5 weakly pigmented ocelli; Tõmõsváry's organ large, greater than adjoining ocelli in *L. javanicus*), the presence of 1–2 setae on the male gonopod (*L. javanicus* has no setae on the male gonopod), and of tridentate claws of the female gonopod (a simple, narrow and strongly curved claw in *L. javanicus*). Differs from all the species compared above in the larger body and the bipartite tarsi starting from leg 5 to 8.

Table 3. Spinulation of *L. minimus* sp.n. (holotype)
Таблица 3. Распределение шипов на ногах *L. minimus* sp.n. (голотип)

Leg pairs	V					D				
	C	Tr	P	F	T	C	Tr	P	F	T
1	–	–	–	m	m	–	–	p	a	a
2–3	–	–	–	am	m	–	–	p	a p	a p
4	–	–	–	am	m	–	–	(p)	a p	a p
5–8	–	–	–	am	m	–	–	–	a p	a p
9	–	–	–	am	(a)m	–	–	–	a p	a p
10	–	–	–	am	am	–	–	–	a p	a p
11	–	–	–	am	am	–	–	mp	a p	a p
12	–	–	p	amp	am	–	–	mp	p	p
13	–	–	mp	amp	am	(a)	–	mp	p	p
14	–	m	amp	am	m	a	–	mp	p	–
15	–	m	amp	am	–	a	–	mp	–	–

DISTRIBUTION. Only the terra typica. Charyn River Valley is highly remarkable in being ancient and still harbouring a very old riparian forest amidst semi-desert to desert.

Lithobius (Monotarsobius) minimus **sp.n.**
Figs 27–42.

Holotype ♂ (ZMUM), Eastern Kazakhstan, Almaty Area, Dzhungarsky Alatau Mts, 6 km SE Rudnichnyi, Koksu River Canyon, 1300—1400 m a.s.l., 44°41'N, 78°58'E, *Betula, Populus, Picea* etc. forest, 09—10.VI.2001, leg. SIG.

Paratypes: 13 ♂♂ 14 ♀♀ (ZMUM), 3 ♂♂ 3 ♀♀ (PSU), same data as holotype.

Non-type material: 9 ♂♂ (ZMUM), Eastern Kazakhstan, Almaty Area, Zharkent (= Panfilov) Distr., 8 km N Sarybei, Dzhungarsky Alatau Mts, Tyshkan River Canyon, 1700—1800 m a.s.l., 44°30'N, 80°04'E, *Picea* forest with *Salix, Berberis* etc. bush, 06—07.VI.2001, leg. SIG.

DIAGNOSIS. The new species is characterised by the small size and the flat and wide wart on male tibia 15.

DESCRIPTION. Holotype. Body 7.4 long, brown, tinted grey; head slightly infuscate. All tergites with rounded caudal corners, terminal tergite as in Fig. 27. Head slightly elongate, length to breadth ratio 1.1:1, median notch not developed; head considerably broader than tergite I, ratio 1.3:1 (Fig. 27). Labrum, mandible and maxillae I and II as in Figs 30, 31, 33 & 40.

Antennae about 3–3.5 times as long as head, with 20 antennomeres; terminal antennomere as in Fig. 28. Ocelli: 7–10 on each side in 2–3 rows, small; Tõmõsváry's organ as large as adjoining ocelli, rounded (Fig. 29).

Lateral sides of coxosternite gently sloping, with 2+2 acute large teeth as well as long and strong porodonts; medium cut deep (Fig. 32).

Legs 1-12 with clearly unipartite tarsi. Legs 14 and 15 with coxolateral spines; legs 1–14 with accessory claws (Fig. 41), leg 15 without accessory claw, with only a rudimentary claw visible at high magnification (Fig. 42). Leg spinulation as in Tab. 3. Coxal pores present on legs 12–15, each with 1–2 poorly visible, small, rounded pores. Leg 14 and 15 a little enlarged, with glandular pores; tibia 15 with a distally located, flat and wide wart with a crater in the middle which is surrounded by nine setae (Figs 34 & 35).

Gonopods 1-segmented, with 2 setae placed at gonopod middle (Figs 37 & 39).

Male variation. Body 7.4 (6.8–9.0) long. Length to breadth ratio of terminal tergite 1.1–1.2:1. Ratio of head to tergite I: 1.2–1.3:1. Antennae with 20–22 antennomeres, length to breadth ratio of terminal antennomere 2.5–3.0:1. Male wart 15 with 8–10 setae. Leg spinulation as in holotype.

Female. Body 15.5 (13.3–18.5) long. Diagnostic characters and legs spinulation as in male, but length to breadth ratio of head 0.9–1:1, terminal tergite as long as wide. Gonopods without setae on internal face, with 2+2 spurs abruptly narrowed distad; claw with three well-developed teeth. Segment I without spines, segment II with two, segment III with a single, strong, dorsal spine (Fig. 38).

REMARKS. The new species is similar to *L. ferganensis* [Zalesskaja, 1978: 162 & 163], based on the main somatic characters and leg spinulation, but differs by the number of antennomeres (19–20 in *L. ferganensis*), the larger and wider wart on male tibia 15 which carries more numerous setae (4–5 short setae in *L. ferganensis*), the tridentate claws of the female gonopod (bidentate in *L. ferganensis*), and the presence of two setae on the male gonopod (*L. ferganensis* with a single seta). *L. minimus* sp.n. is close to the group of species containing both *L. turkestanicus* and *L. ketmenensis* sp.n. in similar secondary sexual characters in the male and in tridentate claws on the female gonopod, but it is distinguished by the smaller body, a different pattern of leg spinulation and the less numerous coxal pores (3–5 on legs 12–15 in each of the species compared above).

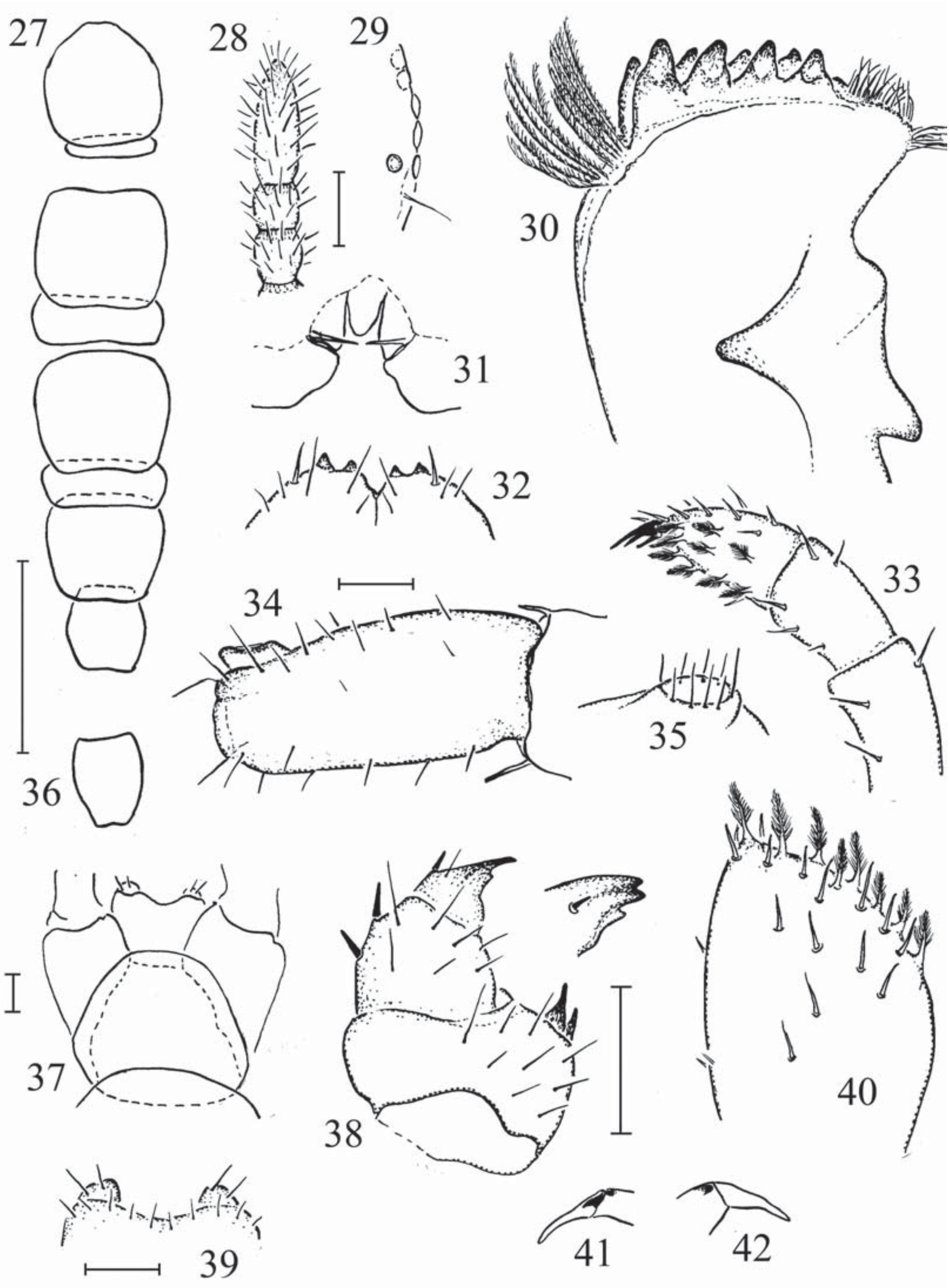
DISTRIBUTION. Only the terra typica.

Lithobius (Monotarsobius) insolitus **sp.n.**
Figs 43–51.

Holotype ♂ (ZMUM), Eastern Kazakhstan, Urjar Distr., Tarbagatay Mts, 5 km N Kestesken, Karakol River, ca 500 m a.s.l., 47°16'N, 80°49'E, riverine *Salix, Populus* etc. forest with *Rosa, Lonicera* etc. bush, 26—27.VI.2001, leg. SIG.

Paratypes: 3 ♀♀ (ZMUM), same data as holotype.

Non-type material: 1 ♂ (ZMUM), Eastern Kazakhstan, Almaty Area, Dzhungarsky Alatau Mts, 6 km SE Rudnichnyi, Koksu River Canyon, 1300—1400 m a.s.l., 44°41'N, 78°58'E, *Betula, Populus, Picea,* etc. forest, 09—10.VI.2001; 3 ♂♂, 5 ♀♀ (PSU), Eastern Kazakhstan, Urjar Distr., Tarbagatay Mts, 4 km N Alexeevka, ca 1000 m a.s.l., *Populus, Malus, Salix* etc. forest with *Rosa*, *Lonicera* etc. bush, 24—25.VI.2001, leg. SIG; 26 ♂♂, 17 ♀♀ (ZMUM) Eastern Kazakhstan, Makanchi Distr., Tarbagatay Mts, 4 km NE Petrovskoe (= Kyzylbulak), Kyzylbulak River Valley, 1100—1200 m a.s.l., 47°03'N, 82°18'E, riverine *Populus,*



Figs 27—42. *Lithobius minimus* sp.n., holotype: 34 & 35 — male tibia 15, lateral view; paratypes: 27 — female head with tergite I and tergites X—XVI, dorsal view; 28 — last three antennomeres; 29 — ocelli with Tõmõsváry's organ, ventral view; 30 — mandible, lateral view; 31 — labrum, ventral view; 32 — coxosternite; 33 — maxilla I, lateral view; 36 — male terminal tergite, dorsal view; 37 — male caudal body end with gonopods, ventral view; 38 — left female gonopod, ventral view, and detail of the claw, lateral view; 39 — male gonopods, ventral view; 41 & 42 — claws of legs 14 and 15, respectively. Scale bars: 0.1 mm.

Рис. 27—42. *Lithobius minimus* sp.n., голотип: 34 и 35 — голень 15 самца, латерально; паратипы: 27 — голова с тергитом I и тергиты X—XVI, дорсально; 28 — три последних членика антенны; 29 — глазки с темешвариевым органом, вентрально; 30 — мандибула, латерально; 31 — верхняя губа, вентрально; 32 — коксостернум ногочелюсти; 33 — максилла I, латерально; 36 — терминальный тергит самца, дорсально; 37 — задний конец тела самца с гоноподами, вентрально; 38 — левый гонопод самки, вентрально и часть когтя, латерально; 39 — гонопод самца, вентрально; 41 и 42 — соответственно когти ног 14 и 15. Масштаб 0,1 мм.

Table 4. Spinulation of *L. insolitus* sp.n. (holotype)
Таблица 4. Распределение шипов на ногах *L. insolitus* sp.n. (голотип)

Leg pairs	V					D				
	C	Tr	P	F	T	C	Tr	P	F	T
1	–	–	p	am	m	–	–	p	a p	a p
2	–	–	p	amp	m	–	–	p	a p	a p
3–8	–	–	p	amp	am	–	–	a p	a p	a p
9	–	–	mp	amp	am	–	–	a p	a p	a p
10–11	–	–	mp	amp	am	a	–	amp	p	a p
12–13	–	–	amp	amp	am	a	–	amp	p	p
14	–	m	amp	amp	m	a	–	amp	p	–
15	–	m	amp	am	–	a	–	amp	p	–

Malus, Salix forest, 22.VI.2001, leg. SIG. 1 ♂ (ZMUM), Eastern Kazakhstan, environs of Lake Zaysan, Kara-Cheru Mts, stony montane tundra, without date, leg. A.G. Ovsyannikov; 1 ♂, 2 ♀♀ (PSU), Eastern Kazakhstan, Makanchi Distr., Tarbagatay Mts, 6 km NE Kirovka (= Karatuma), Sholakterek River Valley, ca 1200 m a.s.l., 47°10'N, 82°06'E, higly disturbed *Populus* forest with *Salix, Rosa, Lonicera, Crataegus,* 23-24.VI.2001, leg. SIG; 2 ♂♂, 1 ♀ (PSU), Eastern Kazakhstan, Makanchi Distr., Tarbagatay Mts, near Kirovka (= Karatuma), Sholakterek River Valley, ca 850 m a.s.l., 47°07'N, 82°02'E, *Populus, Malus, Salix* etc. forest with Rosa, Lonicera, Amygdalus, 23-24.VI.2001, leg. SIG.

NAME. To emphasize the peculiar location of the wart on leg 14, "insolitus" in Latin meaning "strange".

DIAGNOSIS. The new species is characterised by the presence of accessory claws on legs 15, of the distodorsal wart on male tibia 14 and of the distodorsal spine on segment I of the female gonopod.

DESCRIPTION. Holotype. Body 9.4 long, brown. All tergites with rounded posterior corners; terminal tergite convex, with a straight posterior border, length to breadth ratio of terminal tergite 1.1:1 (Fig. 51). Head as long as wide, median notch well-expressed; head broader than tergite I, ratio 1.3:1 (Fig. 43).

Antennae about 3.5–4 times as long as head, with 20 longitudinal antennomeres; length to breadth ratio of terminal antennomere 2.8:1 (Fig. 45). Ocelli: 7 on each side in 2–3 rows; Tõmõsváry's organ as large as nearest ocellus, rounded (Fig. 46).

Coxosternite with 2+2 acute teeth and thin porodonts, lateral sides of coxosternite strongly sloping behind porodonts (Fig. 44).

Legs 1–12 with clearly unipartite tarsi. Legs 10–15 with coxolateral spines; leg 15 with an accessory claw; leg spinulation as in Tab. 4. Legs 14 & 15 dilated, with erect setae; leg 15 without distinct secondary sexual characters; tibia 14 with a dorsolateral wart bearing a crater on top and armed with short light setae; wart located inside a sharp distodorsal emargination of tibia (Fig. 47).

Coxal pores on legs 12–15 small, rounded, separated from one another by more than 1.5–2.5 their diameter; formula 2(3),3,3,2. Gonopod 1-segmented, with two setae at gonopod middle (Fig. 49).

Male variation. Body 9.7 (9.0–10.4) long. Antennae with 17–20 antennomeres, length to breadth ratio of terminal antennomere 2.8–3.4:1. Ocelli: 7–11. Legs 9–15 with coxolateral spines; leg spinulation as in holotype.

Female. Body 10.3 (9.8–10.7) long. Diagnostic characters and leg spinulation as in male, but terminal tergite enlarged, length to breadth ratio 0.9:1 (Fig. 50); number of coxal pores: 3,3,3(4),3.

Gonopods without setae on internal face, with 2+2 conical and curved spurs; all gonopod segments with dorsal unequal spines: segment I with a single, II with four, III again with a single short spine; gonopod claw strong, tridentate, all teeth well-developed (Fig. 48).

REMARKS. The new species seems to be especially similar to *L. worogowensis* Eason, 1976 [Zalesskaja, 1978: 153 & 154], based on the presence of accessory claws on legs 15 and the distodorsal wart on male tibia 14, but it differs in leg spinulation, the presence of coxolateral spines on legs (9)10–15 (on legs 13–15 in *L. worogowensis*) and of a distodorsal spine on segment I (without spines in *L. worogowensis*), as well as in a well-developed, tridentate claw of the female gonopod (a broad and blunt claw with poorly developed teeth in *L. worogowensis*), and the formula of coxal pores being 2(3),3,3,2–2333 (3444–3433 in *L. worogowensis*).

DISTRIBUTION. This species is rather widespread, apparently being restricted to, and common in, the Dzhungarsky Alatau and Tarbagatay mountains.

Lithobius (Monotarsobius) tuberofemoratus sp.n.
Figs 52–60.

Holotype ♂ (ZMUM), Eastern Kazakhstan, Almaty Area, Dzhungarsky Alatau Mts, 6 km SE Rudnichnyi, Koksu River Canyon, 1300—1400 m a.s.l., 44°41'N, 78°58'E, *Betula, Populus, Picea* etc. forest, 09—10.VI.2001, leg. SIG.

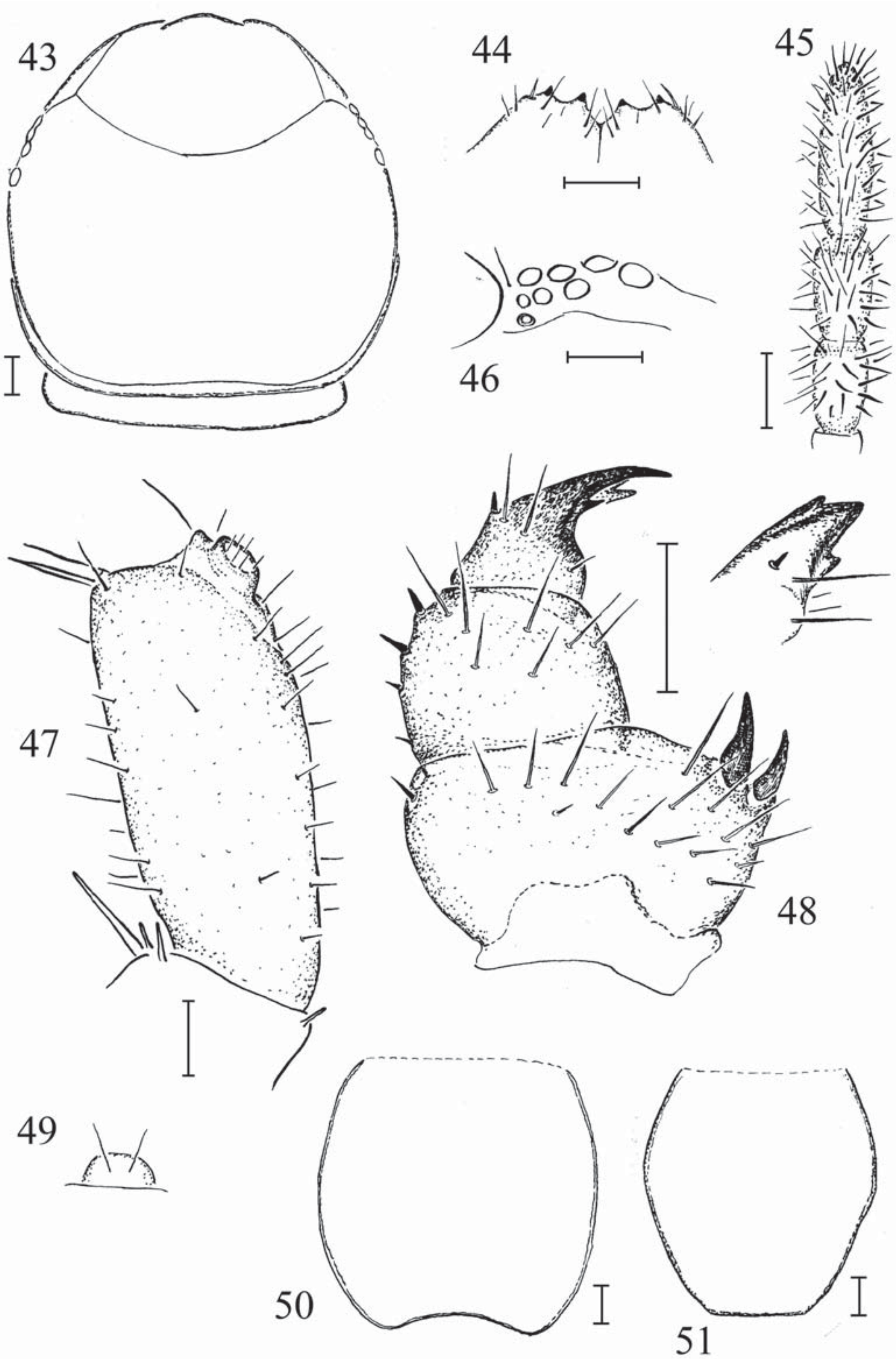
Paratypes: 7 ♀♀ (ZMUM), 1 ♂, 1 ♀ (PSU), same data as holotype.

NAME. To emphasize the position of the distodorsal process on femora 15.

DIAGNOSIS. The new species is characterised by the uniformly yellow body, three ocelli on each side in one row, as well as the unarmed and non-sulcate distodorsal processes on male femora 15.

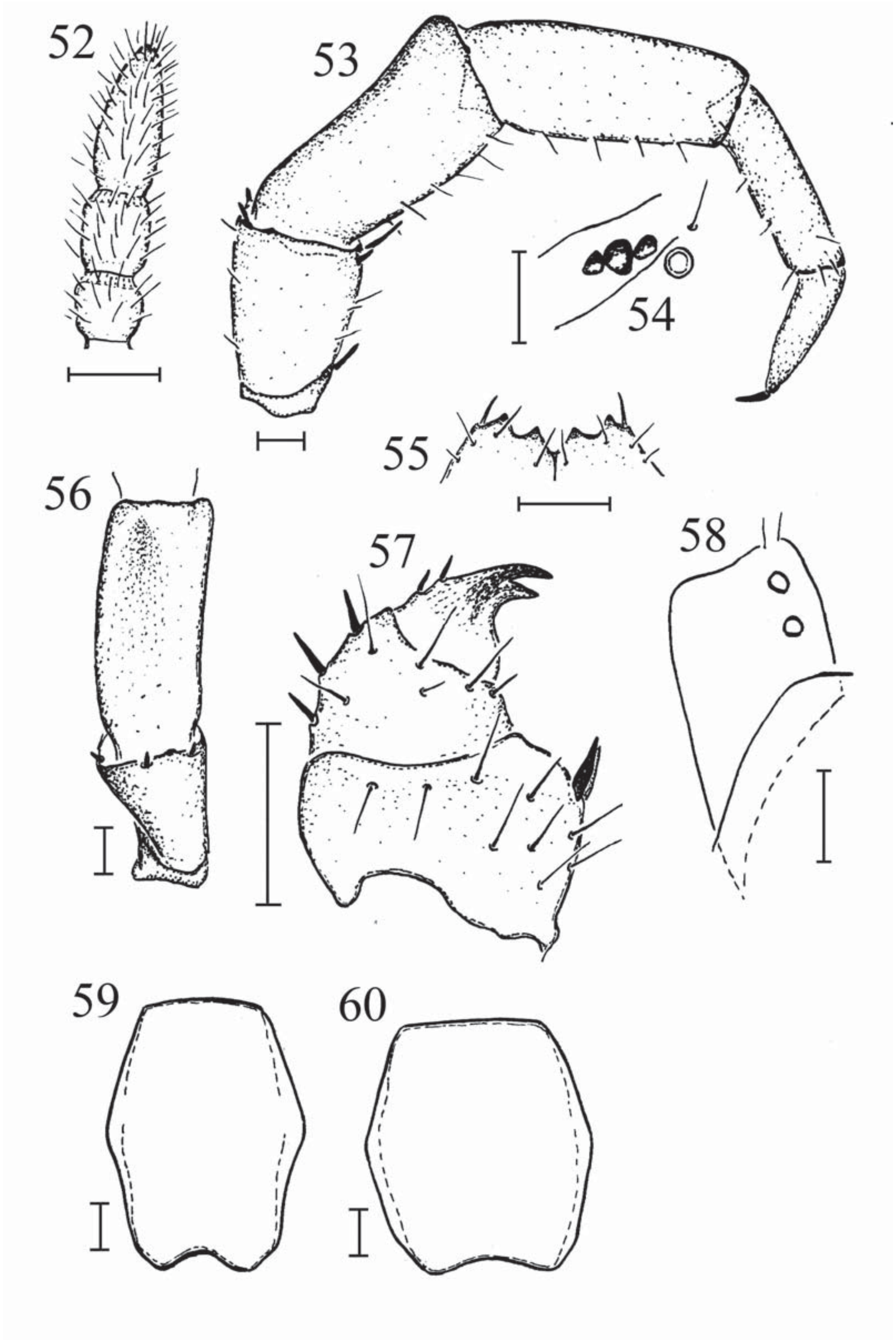
DESCRIPTION. Holotype. Body 7.8 long, uniformly yellow. All tergites with rounded posterior corners; terminal tergite with a deeply emaginate caudal edge, length to breadth ratio 1.4:1 (Fig. 59). Head as long as wide, median notch poorly visible. Head broader than tergite I, ratio 1.2 :1.

Antennae shorter than 1/3 body length, with 18–19 moniliform antennomeres; terminal antennomere as in Fig. 52; length to breadth ratio of terminal antennomere 2.3:1. Ocelli: 3 on each side in one row, medial ocellus a little larger than lateral ones; Tõmõsváry's organ large and rounded, as large as medial ocellus (Fig. 54).



Figs 43–51. *Lithobius insolitus* sp.n., paratypes: 43 — male head with tergite I, dorsal view; 44 — coxosternite; 45 — last three antennomeres; 46 — ocelli with Tõmõsváry's organ, ventral view; 47 — male tibia 14, dorsolateral view; 48 — left female gonopod, ventral view, and detail of the claw, lateral view; 49 — male gonopod, ventral view; 50 — female terminal tergite, dorsal view; 51 — male terminal tergite, dorsal view. Scale bars: 0.1 mm.

Рис. 43–51. *Lithobius insolitus* sp.n., паратипы: 43 — голова с тергитом I, дорсально; 44 — коксостернум ногочелюсти; 45 — три последних членика антенны; 46 — глазки с темешвариевым органом, вентрально; 47 — голень 14 самца, дорсолатерально; 48 — левый гонопод самки, вентрально, и часть когтя, латерально; 49 — гонопод самца, вентрально; 50 — терминальный тергит самки, дорсально; 51 — терминальный тергит самца, дорсально.Масштаб 0,1 мм.



Figs 52–60. *Lithobius tuberofemoratus* sp.n., holotype: 52 — last three antennomeres; 53 — male femur 15, lateral view; 56 — same, dorsal view; paratypes: 54 — ocelli with Tõmõsváry's organ, lateral view; 55 — coxosternite; 57 — left female gonopod, ventral view; 58 — male coxa 15, ventral view; 59 — male terminal tergite, dorsal view; 60 — female terminal tergite, dorsal view. Scale bars: 0.1 mm.

Рис. 52–60. *Lithobius tuberofemoratus* sp.n., голотип: 52 — три последних членика антенны; 53 — бедро 15 самца, латерально; 56 — то же, дорсально; паратипы: 54 — глазки с темешвариевым органом, латерально; 55 — коксостернум ногочелюсти; 57 — левый гонопод самки, вентрально; 58 — тазик 15 самца, вентрально; 59 — терминальный тергит самца, дорсально; 60 — терминальный тергит самки, дорсально. Масштаб 0,1 мм.

Table 5. Spinulation of *L. tuberofemoratus* sp.n.
Таблица 5. Распределение шипов на ногах *L. tuberofemoratus* sp.n.

Leg pairs	V					D				
	C	Tr	P	F	T	C	Tr	P	F	T
Holotype										
1	–	–	p	m	m	–	–	p	(a) p	(a)
2	–	–	p	m	m	–	–	p	(a) p	a p
3	–	–	p	am	m	–	–	p	a p	a p
4	–	–	–	am	m	–	–	(p)	a p	a p
5	–	–	–	am	m	–	–	–	a p	a p
6–7	–	–	–	am	m	–	–	–	(a) p	a p
8	–	–	–	am	m	–	–	–	p	a p
9	–	–	–	am	m	–	–	–	p	(a) p
10	–	–	–	(a)m	am	–	–	–	a p	(a) p
11	–	–	m(p)	amp	am	–	–	p	p	p
12	–	–	mp	amp	am	–	–	p	p	p
13	–	–	mp	amp	am	a	–	mp	p	p
14	–	m	amp	am	–	a	–	mp	p	–
15	–	m	amp	am	–	a	–	amp	–	–
Paratypes										
1	–	–	(a) p	m	m	–	–	p	(a) p	(a)
3	–	–	(p)	(a)m	m	–	–	p	(a) p	a p
3	–	–	p	am	m	–	–	p	a p	a p
4	–	–	–	am	m	–	–	(p)	a p	a p
5	–	–	–	am	m	–	–	(p)	a p	a p
6–8	–	–	–	am	m	–	–	–	(a) p	a p
9	–	–	–	am	(a)m	–	–	–	(a) p	a p
10	–	–	–	am	am	–	–	(p)	a p	a p
11	–	–	m(p)	amp	am	–	–	p	p	a p
12	–	–	mp	amp	am	–	–	p	p	p
13	–	–	mp	amp	am	a	–	mp	p	p
14	–	m	amp	am	–	a	–	mp	p	–
15	–	m	amp	am	–	a	–	amp	–	–

Coxosternite narrow, its lateral sides strongly sloping; with 2+2 teeth, internal teeth placed considerably lower than external ones; long porodonts on slightly projecting corners of coxosternite; medium cut as in Fig. 55.

Legs 1–12 with clearly unipartite tarsi. Legs 13–15 with coxolateral spines; legs 1–14 with accessory claws, leg 15 without accessory claw. Leg spinulation as in Tab. 5, spines especially poorly visible on legs of anterior body half. Coxal pores rounded, separated from one another by about the same distance as, or greater than, their diameter, formula 2332 (observed range: 2,2,2(3),2). Coxal pores on leg 15 as in Fig. 58. Legs 15 slightly dilated; each femur 15 with a distodorsal process very poorly flattened on mesal face (Figs 53 & 56).

Gonopods 1-segmented, with a single seta apically.

Male variation. Body 7.8–8.3 long. Head as long as or a little longer than wide, length to breadth ratio 1.0–1.1:1. Breadth of head to breadth of tergite I ratio 1.2–1.3:1. Length to breadth ratio of terminal antennomere 2.0–2.3:1. Number of coxal pores: 2,2,2(3),2.

Female. Body 7.6 (6.8–8.2) long. Diagnostic characters and leg spinulation as in male, but antennae with 16–19 antennomeres; length to breadth ratio of terminal tergite 1.1–1.2:1 (Fig. 60); number of coxal pores: 2333. Gonopods without setae on internal face, with 2+2 slender spurs separated from one another by less than, or about the same as, their diameter at base; gonopod claw with two well-developed teeth. Segment I without spines, segment II with three, segment III with two dorsal spines (Fig. 57).

REMARKS. This new species is similar to *L. porathi* Sseliwanoff, 1881 [Zalesskaja, 1978: 157–159; Eason, 1996], based on body length, coxosternite structure and the round shape of the distodorsal processes on femora 15, but it differs in the number of ocelli (3 versus 5–9 in *L. porathi*), the formula of coxal pores (3443 in *L. porathi*), the absence of an accessory claw from leg 15, in the spinulation of legs 14 and 15 (14 DCaPmpFp, VTrmPampFampTm; 15 DcaPmp, VTrmPampF(a)m in *L. porathi*), in male femora 15 being devoid both of setae and dorsal sulcus on the process; and in segment II of the female gonopod with three strong spines (four shorter spines in *L. porathi*).

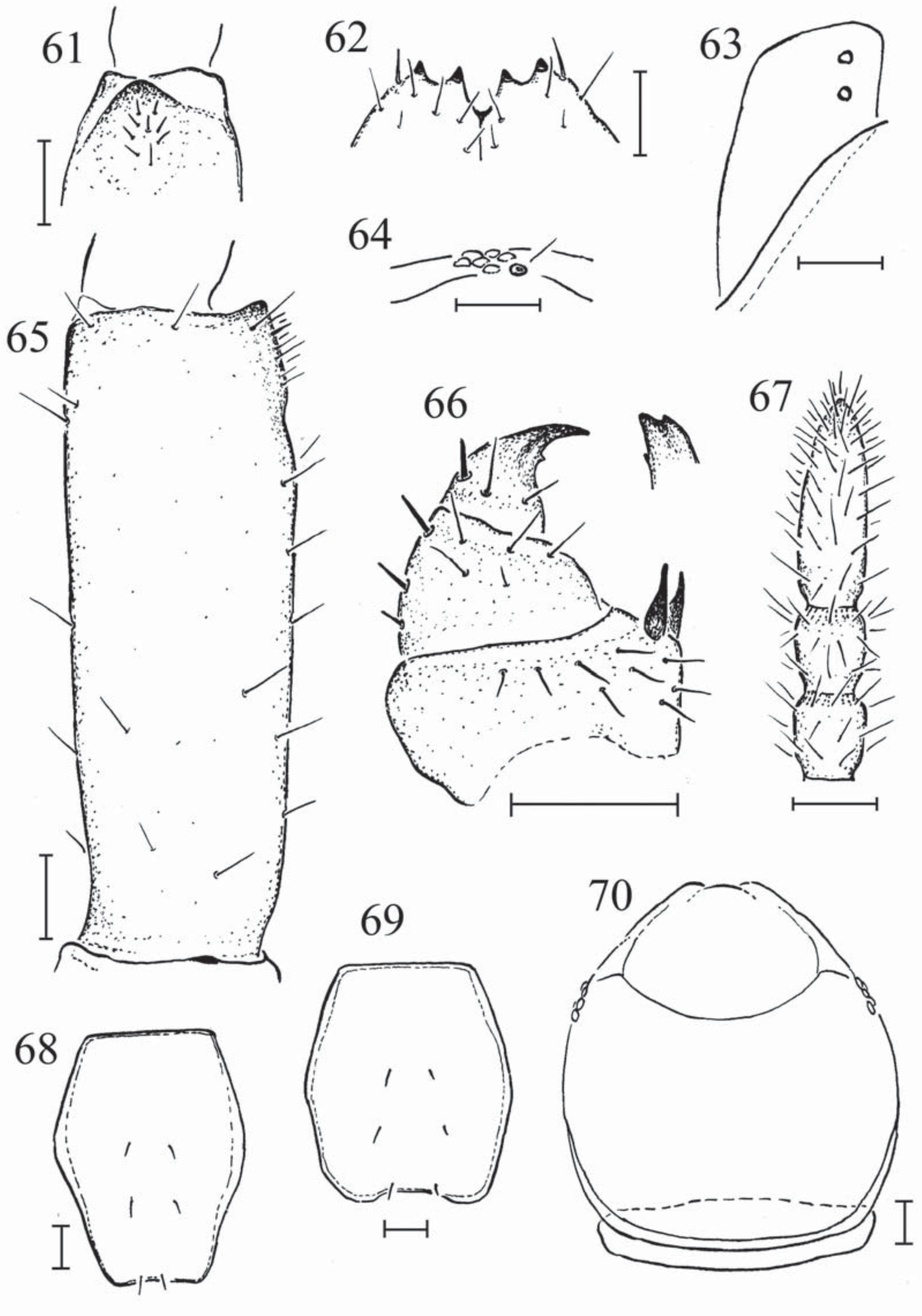
DISTRIBUTION. Only the terra typica.

Lithobius (Monotarsobius) tarbagataicus **sp.n.**
Figs 61–70.

Holotype ♂ (ZMUM), Eastern Kazakhstan, Urjar Distr., Tarbagatay Mts., 4 km N Alexeevka, ca 1000 m a.s.l., riverine *Populus, Malus, Salix* etc. forest with *Rosa*, *Lonicera* etc. bush, 24—25.VI.2001, leg. SIG.

Paratypes: 6 ♂♂, 5 ♀♀ (ZMUM), same data as holotype.

Non-type material: 1 ♂ (PSU), Eastern Kazakhstan, Urjar Distr., Tarbagatay Mts., 5 km N Kestesken, Karakol River, ca 500 m a.s.l., 47°16'N, 80°40'S, riverine *Salix, Populus* etc. forest with *Rosa*, *Lonicera* etc. bush, 26—27.VII.2001, leg. SIG; 1 ♂, 3 ♀♀ (ZMUM), Eastern Kazakhstan, Makanchi Distr., Tarbagatay Mts., 6 km NE Kirovka (= Karatuma), Sholakterek River Valley, ca 1200 m a.s.l.,



Figs 61—70. *Lithobius tarbagataicus* sp.n., paratypes: 61 — male tibia 15, dorsal view; 65 — same, lateral view; 62 — coxosternite; 63 — male coxa 15, ventral view; 64 — ocelli with Tõmõsváry's organ, ventrolateral view; 66 — left female gonopod, ventral view, and detail of the claw, lateral view; 67 — last three antennomeres; 68 — male terminal tergite, dorsal view; 69 — female terminal tergite, dorsal view; 70 — head with tergite I, dorsal view. Scale bars: 0.1 mm.

Рис. 61—70. *Lithobius tarbagataicus* sp.n., паратипы: 61 — голень 15 самца, дорсально; 65 — то же, латерально; 62 — коксостернум ногочелюсти; 63 — тазик 15 самца, вентрально; 64 — глазки с темешвариевым органом, вентралатерально; 66 — левый гонопод самки, вентрально, и часть когтя, латерально; 67 — три последних членика антенны; 68 — терминальный тергит самца, дорсально; 69 — теринальный тергит самки, дорсально; 70 — голова с тергитом I, дорсально. Масштаб 0,1 мм.

Table 6. Spinulation of *L. tarbagataicus* sp.n.
Таблица 6. Распределение шипов на ногах *L. tarbagataicus* sp.n.

Leg pairs	V					D				
	C	Tr	P	F	T	C	Tr	P	F	T
Holotype										
1	–	–	p	am	m	–	–	p	a p	a
2	–	–	p	am	(a)m	–	–	p	(a) p	a p
3-6	–	–	p	am	am	–	–	p	a p	a p
7-8	–	–	p	am	am	–	–	a p	a p	a p
9	–	–	mp	amp	am	–	–	a p	a p	a p
10	–	–	mp	amp	am	–	–	a p	(a) p	a p
11	–	–	mp	amp	am	–	–	a p	p	a p
12	–	–	mp	amp	am	–	–	amp	p	p
13	–	–	mp	amp	am	a	–	amp	p(2p)	p
14	–	m	amp	amp	m	a	–	amp	p	p
15	–	m	amp	am	–	a	–	amp	p	–
Paratypes and non-type material										
1	–	–	p	(a)m	m	–	–	p	a p	a
2	–	–	p	am	(a)m	–	–	(a) p	(a) p	a p
3	–	–	p	am	am	–	–	(a) p	a p	a p
4–7	–	–	p	am	am	–	–	a p	a p	a p
8	–	–	p	am	m	–	–	a p	a p	(a) p
9–10	–	–	mp	amp	am	–	–	a p	a p	a p
11	–	–	mp	amp	am	–	–	a p	p	a p
12	–	–	mp	amp	am	–	–	amp	p	p
13	–	–	mp	amp	am	(a)	–	amp	p	p
14	–	m	amp	amp	m	a	–	amp	p	p
15	–	m	amp	am	–	a	–	amp	p	–

47°10'N, 82°06'E, higly disturbed *Populus* forest with *Salix*, *Rosa*, *Lonicera*, *Crataegus* etc., 23—24.VI.2001, leg. SIG; 1 ♂ (ZMUM), Eastern Kazakhstan, Makanchi Distr., Tarbagatay Mts., 4 km NE Petrovskoe (= Kyzylbulak), Kyzylbulak River Valley, 1100—1200 m a.s.l., 47°03'N, 82°18'E, riverine *Populus*, *Malus*, *Salix* etc. forest, 22.VI.2001, leg. SIG; 1 ♂ (PSU), Eastern Kazakhstan, Urjar Distr., Tarbagatay Mts., 4 km N Alexeevka, Urjar River Valley, ca 1000 m a.s.l., 47°17'N, 81°34'E, *Populus, Malus, Salix* etc. forest with Rosa, Lanicera etc. bush, 24—25.VI.2001, leg. SIG.

NAME. To emphasize the terra typica.

DIAGNOSIS. The new species is characterised by the presence of a setigerous distodorsal process on male tibia 15.

DESCRIPTION. Holotype. Body 9.7 long, brown. All tergites with rounded caudal corners; length to breadth ratio of terminal tergite 1.4:1 (Fig. 68). Head slightly elongate, length to breadth ratio 1.1:1, median notch well-expressed; head broader than tergite I, ratio 1.2:1 (Fig. 70).

Antennae about 3–3.5 times as long as head, with 20 longitudinal antennomeres; length to breadth ratio of terminal antennomere 3.3:1 (Fig. 67). Ocelli: 6–9 on each side in two rows, dark; Tõmõsváry's organ as large as nearest ocellus, rounded (Fig. 64).

Coxosternite with 2+2 acute teeth and long porodonts, lateral sides of coxosternite strongly sloping. Medium cut very deep (Fig. 62).

Legs 1-12 with clearly unipartite tarsi. Legs 13–15 with coxolateral spines; legs 1–14 with accessory claws, leg 15 without accessory claw. Leg spinulation as in Tab. 6. Tibia 15 with a small dorsolateral process armed with a group of setae (Figs 61 & 65).

Coxal pores on legs 12–15 small, rounded, separated from one another by distances 1.5–2 times greater than their own diameter; formula 2,2(3),2(3),2; coxal pores on coxa 15 as in Fig. 63. Gonopod 1-segmented, with a single seta.

Male variation. Body 9.4 (8.5–10.1) long. Length to breadth ratio of terminal tergite 1.3–1.6:1. Length to breadth ratio of head 1–1.1:1. Head broader than tergite I, ratio 1.2–1.3:1. Length to breadth ratio of terminal antennomere 2.7–3.7:1. Leg spinulation as in Tab. 6.

Female. Body 9.3 (8.5–10.3) long. Diagnostic characters and leg spinulation as in male, but length to breadth ratio of terminal tergite 1.1–1.2:1 (Fig. 69); number of coxal pores: 2333.

Gonopods without setae on internal face, with 2+2 lanceolate spurs; segment I without spines, II with three (more rarely two), III with a single dorsal spine; gonopod claw tridentate, external tooth rudimentary, can be absent from some specimets (Fig. 66).

REMARKS. Based on the presence of a setigerous distodorsal process on male tibia 15, this new species is similar to *L. porathi* [Zalesskaja, 1978: 157–159; Eason, 1996], but differs by the location of the process which lacks a dorsal sulcus (a deep dorsal sulcus ending up by a group of setae on knob present on femur 15 in *L. porathi*); females differ considerably by the longer dorsal spines on the gonopod and the absence of a distodorsal spine on gonopod segment I. *L. tarbagataicus* sp.n. is also similar to *L. curtipes* C.L. Koch, 1847 [Zalesskaja, 1978: 178–180] in leg spinulation, in structure of the female gonopod, in the location and shape of the process on male tibia 15, but it differs in the number of coxal pores (3–5 in *L. curtipes*), the lack of a dorsal sulcus and the presence of a group of setae on the process of male tibia 15, the number of dorsal spines on segment II (four spines in *L. curtipes*), as well as the poorly-expressed tridentate claw of the female gonopod.

DISTRIBUTION. Only the terra typica.

Table 7. Spinulation of *L. canaricolor* sp.n.
Таблица 7. Распределение шипов на ногах *L. canaricolor* sp.n.

Leg pairs	V					D				
	C	Tr	P	F	T	C	Tr	P	F	T
Holotype										
1	–	–	(m)p	am	am(p)	–	–	a p	a p	a p
2-5	–	–	mp	amp	am	–	–	a p	a p	a p
6–8	–	–	mp	amp	am	–	–	(a) p	a p	a p
9	–	–	mp	amp	am	–	–	a p	a p	a p
10-11	–	–	mp	amp	am	a	–	a p	a p	a p
12	–	–	amp	amp	am	a	–	(a) p	a p	a p
12–13	–	–	amp	amp	am	a	–	amp	p	a p
14	–	m	amp	am	a	a	–	amp	p	p
15	–	m	amp	am	a	a	–	amp	p	–
Paratypes										
1	–	–	(m)p	am	am(p)	–	–	(a) p	a p	(a)(p)
2	–	–	mp	amp	am	–	–	(a) p	a p	(a) p
3–9	–	–	mp	amp	am	–	–	(a) p	a p	a p
10	–	–	mp	amp	am	(a)	–	(a) p	a p	a p
11	–	–	mp	amp	am	a	–	(a) p	a p	a p
12–13	–	–	amp	amp	am	a	–	amp	p	a p
14	–	m	amp	am	a	a	–	amp	p	p
15	–	m	amp	am	a	a	–	amp	p	–

Lithobius (Monotarsobius) canaricolor sp.n.
Figs 71–81.

Holotype ♀ (ZMUM), Eastern Kazakhstan, Almaty Area, Dzhungarsky Alatau Mts, 6 km SE Rudnichnyi, Koksu River Canyon, 1300—1400 m a.s.l., 44°41'N, 78°58'E, *Betula, Populus, Picea* etc. forest, 09—10.VI.2001, leg. SIG.

Paratypes: 1 ♂ (ZMUM), 1 ♀ (PSU), same data as holotype.

NAME. To emphasize the canary yellow body.

DIAGNOSIS. Based on the main somatic characters, both male and female gonopod structure, as well as the presence of clearly unipartite tarsi 1–12, this new species can provisionally be assigned to the subgenus *Monotarsobius* Verhoeff, 1905. However, due to the posterolateral sulci on the femora, tibiae and tarsi 14 and 15 both in the male and female, this species seems to be unique among consubgeners.

DESCRIPTION. Holotype. Body 13.1 (observed range: 13.1–13.4) long, yellow. All tergites with rounded caudal corners; all macrotergites but tergite II elongate; terminal tergite faintly emarginate caudally, length to breadth ratio 1.3:1 (Fig. 81). Head slightly elongate, length to breadth ratio 1.1:1; median notch poorly-expressed. Head a little broader than tergite I, ratio 1.1–1.2:1. Head ventrally as in Fig. 71.

Antennae about 4 times as long as head, with 20 strongly longitudinal antennomeres; terminal antennomere pointed, with dense and short sensilla at apex (Fig. 74). Length to breadth ratio of terminal antennomere 4.1:1 (observed range: 4.0–4.2:1). Ocelli: 3–4 on each side in one row, small; Tõmõsváry's organ about 2 times larger than adjoining ocelli, oblong-oval (Fig. 77).

Coxosternite slightly broadened, length to breadth ratio 1:1.1–1.2 (Fig. 71); lateral sides of coxosternite gently sloping, with 2+2 acute teeth and thin porodonts. Medium cut shallow and wide (Fig. 78).

Legs 1–12 with unipartite tarsi. All legs covered with erect light setae; legs 10–15 with coxolateral spines; legs 1–13 with two well-expressed accessory claws, each of legs 14 and 15 with a very small, rudimentary accessory claw visible only at high magnification. Leg spinulation as in Tab. 7. Leg 14 and 15 with posterolateral sulci, these very faint on femora and better expressed on tibiae and tarsomeres (Figs 72 & 73).

Coxal pores on legs 12–15 rounded, distance between pores varying, more or less equal to diameter of an adjacent pore; formula 3,4,4,3(4) (Fig. 75).

Gonopods without setae on internal face, with 2+2 closely spaced lanceolate spurs; segment I without spines, II with four, III with two dorsal spines forming a row; gonopod claw strong, bidentate (Figs 79 & 80).

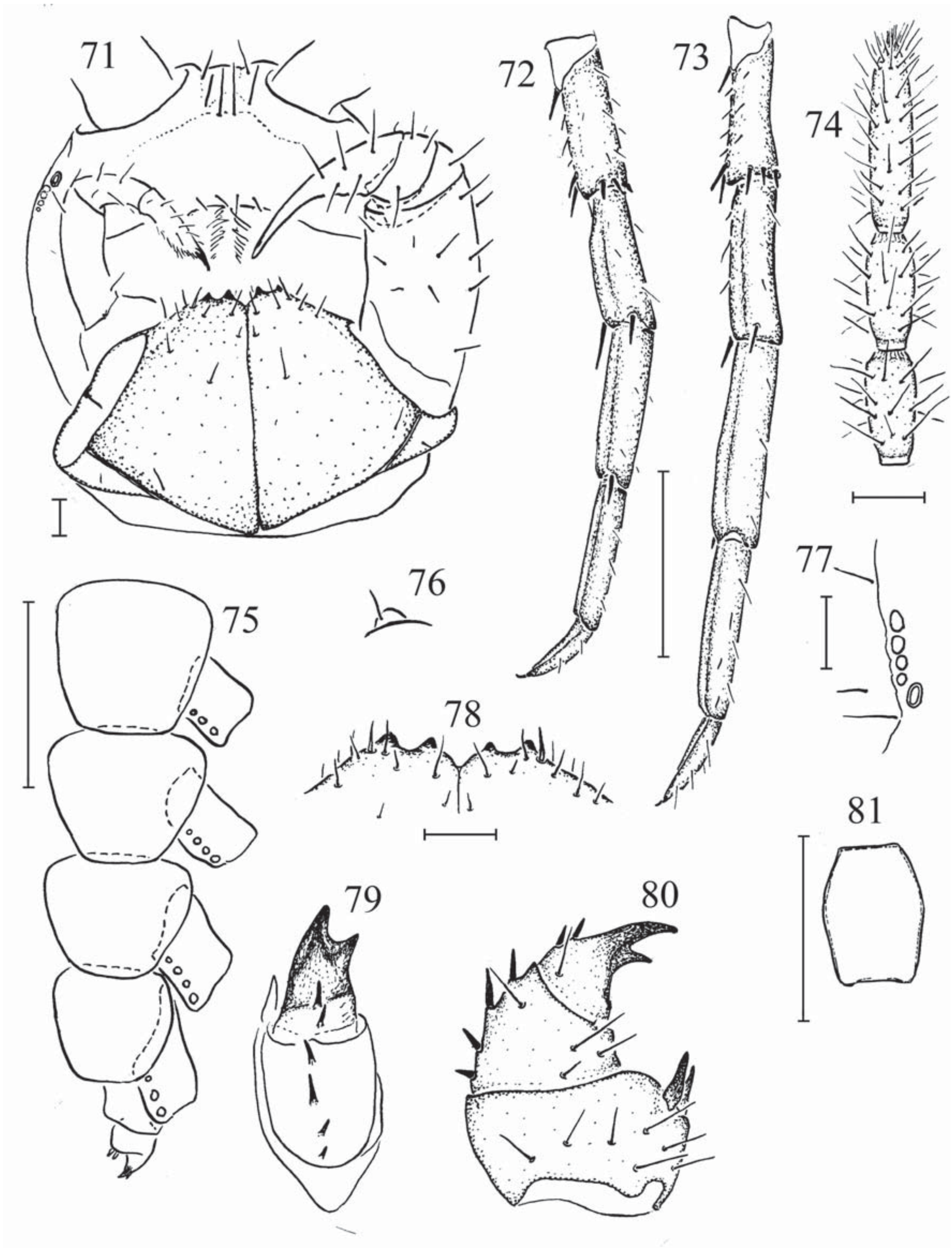
Male. Body 11.8 long. Diagnostic characters as in female, but number of coxal pores: 2332, coxolateral spines on legs 11–15, and body smaller. Gonopod 1-segmented, conical, with a single seta (Fig. 76).

REMARKS. The new species seems to belong to *Monotarsobius* in the general structure of the body, and of the male and female gonopods, as well as due to the distinctly unipartite tarsi 1–12, but it differs by the presence of ventrolateral sulci on legs 14 and 15 both in the male and female, the elongate macrotergites and the slightly oblique edges of the coxosternite. This reminds of the condition observed in species of the subgenus *Kiberbius* Chamberlin, 1916, genus *Lithobius,* in which there are sulci on male and female legs 15; however, the new species differs by the presence in both sexes of ventrolateral sulci on the femora, tibiae, Ts1 and Ts2 of legs 14, and of such sulci on the tibiae, Ts1 and Ts2 of female legs 15. In contrast, in *Kiberbius* species a sulcus is only observed on female femora 15.

DISTRIBUTION. Only the terra typica.

Lithobius (Monotarsobius) simplis sp.n.
Figs 82–94.

Holotype ♀ (ZMUM), Eastern Kazakhstan, Almaty Area, Dzhungarsky Alatau Mts., 7 km E Lepsinsk, Chornaya River Canyon, 1200—1400 m a.s.l., 45°31'N, 80°43'E, *Betula, Malus, Populus* etc. forest, 13—15.VI.2001, leg. SIG.



Figs 71—81. *Lithobius canaricolor* sp.n., holotype: 71 — head with maxillipede, ventral view; 72 — female leg 14, posterolateral view; 73 — female leg 15, posterolateral view; paratypes: 74 — last three antennomeres; 75 — female sternites and coxae 12—15, ventral view; 76 — male gonopod, ventral view; 77 — ocelli with Tõmõsváry's organ, lateral view; 78 — coxosternite; 79 — left female gonopod, lateral view; 80 — same, ventral view; 81 — female terminal tergite, dorsal view. Scale bars: 0.1 mm (71, 74, 77—80) and 1.0 mm (72, 73, 75, 81).

Рис. 71—81. *Lithobius canaricolor* sp.n., голотип: 71 — голова с ногочелюстью, вентрально; 72 — нога 14 самки, задне-латерально; 73 — нога 15 самки, задне-латерально; паратипы: 74 — три последних членика антенны; 75 — стерниты и тазики 12—15 самки, вентрально; 76 — гонопод самца, вентрально; 77 — глазки с темешвариевым органом, латерально; 78 — коксостернум ногочелюсти; 79 — левый гонопод самки, латерально; 80 — то же, вентрально; 81 — терминальный тергит самки, дорсально. Масштаб 0,1 мм (71, 74, 77—80) и 1,0 мм (72, 73, 75, 81).

Table 8. Spinulation of *L. simplis* sp.n.
Таблица 8. Распределение шипов на ногах *L. simplis* sp.n.

Leg pairs	V					D				
	C	Tr	P	F	T	C	Tr	P	F	T
Holotype										
1	–	–	p	amp	(a)m	–	–	p	a p	a
2	–	–	p	amp	am	–	–	p	a p	(a) p
3	–	–	p	amp	am	–	–	p	a p	a p
4–6	–	–	mp	amp	am	–	–	p	a p	a p
7-11	–	–	mp	amp	am	–	–	a p	a p	a p
12-13	–	–	amp	amp	am	a	–	amp	p	p
14	–	m	amp	amp	m	a	–	amp	p	p
15	–	m	amp	am	–	a	–	amp	p	–
Paratypes and non-type material										
1	–	–	p	amp	am	–	–	p	a p	(a)(p)
2	–	–	mp	amp	am	–	–	p	a p	a p
3	–	–	mp	amp	am	–	–	(a) p	a p	a p
4–10	–	–	mp	amp	am	–	–	a p	a p	a p
11	–	–	mp	amp	am	(a)	–	a(m)p	a p	a p
12	–	–	amp	amp	(a)m	a	–	amp	p	p
13	–	–	amp	amp	am	a	–	amp	p	p
14	–	m	amp	amp	m	a	–	amp	amp	(p)
15	–	m	amp	am	–	a	–	amp	amp	–

Paratypes: 11 ♂♂, 8 ♀♀ (ZMUM), 2 ♂♂, 2 ♀♀ (PSU), same data as holotype.

Non-type material: 6 ♂♂, 10 ♀♀ (ZMUM), 2 ♂♂, 2 ♀♀ (PSU), Eastern Kazakhstan, Almaty Area, Dzhungarsky Alatau Mts, 6 km NE Rudnichnyi, Koksu River Canyon, 1300—1400 m a.s.l., 44°41'N, 78°58'E, *Betula, Populus, Picea* etc. forest, 09—10.VI.2001, leg. SIG.

NAME. To emphasize the absence of any marked distinctions in both sexes, "simplis" in Latin meaning "simple".

DIAGNOSIS. The new species is characterised by the absence of secondary sexual characters in the male and the absence of true spines on the female gonopod.

DESCRIPTION. Holotype. Body 9.0 long, brown. All tergites with rounded caudal corners, macrotergites slightly emarginate caudally; terminal tergite as in Fig. 84. Head slightly elongate, length to breadth ratio 1.1–1; median emargination well-developed (Fig. 82). Head a little broader than tergite I, length to breadth ratio 1.2:1.

Antennae about 2–2.5 times as long as head, with 19–20 longitudinal antennomeres; length to breadth ratio of terminal antennomere 2.5–2.7:1 (Fig. 87). Ocelli: 8–9 on each side in 2 rows. Tõmõsváry's organ as large as nearest ocellus, oblong-oval (Fig. 94).

Coxosternite slightly broadened, length to breadth ratio 0.9:1, with 2+2 acute teeth and thin porodonts on protuberances; medium cut deep and wide (Fig. 88).

Legs 1–12 with clearly unipartite tarsi. Legs 12–15 with coxolateral spines; leg 14 with two well-developed accessory claws; leg 15 without accessory claw (Figs 89–90). Leg spinulation as in Tab. 8.

Coxal pores on legs 12–15 small, rounded, separated from one another by distances 1.5–2. times greater than their own diameter; formula 2333.

Gonopods without setae on internal face, with 2+2 spurs; segment I without spines, segment II with 2, segment III with a single, setiform, short, dorsal spine; gonopod claw in fact tridentate (Fig. 86).

Female variation. Body 8.9 (7.8–9.7) long. Length to breadth ratio of terminal antennomere 2.5–2.9:1. Ocelli: 8–10 on each side in 2–3 rows. Gonopod segment II with 2–3 setiform, short, dorsal spines. Claw pointed to varying degrees: internal and middle teeth always well-developed, external tooth usually very small, poorly visible to completely obliterate in some specimens (Fig. 85).

Male. Body 8.2 (8.1–8.4) long. Diagnostic characters and leg spinulation as in female, but terminal tergite different (Fig. 83), number of coxal pores: 2222; without secondary sexual characters.

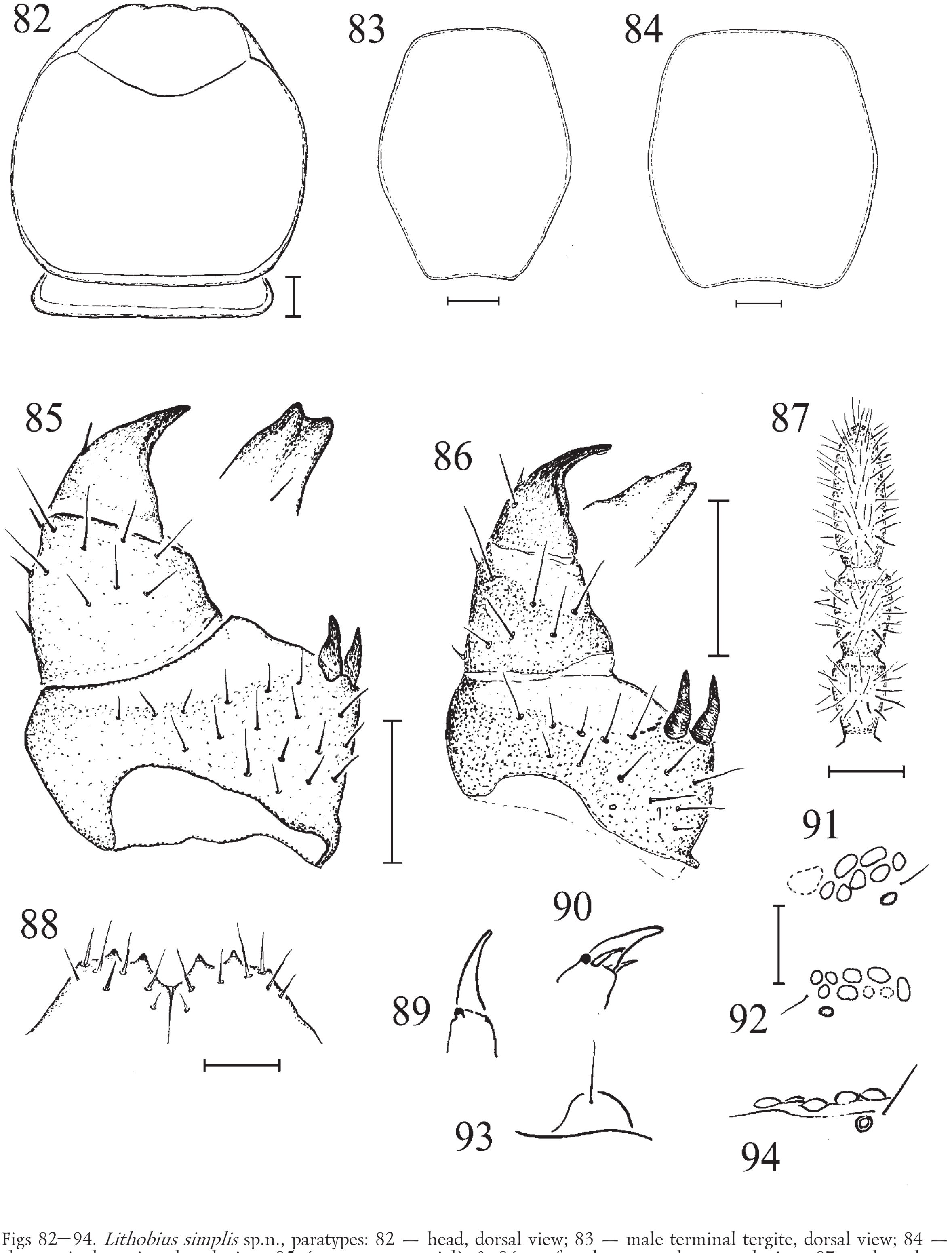
Gonopod 1-segmented, conical, with a single seta at apex (Fig. 93).

REMARKS. By coloration, body length and the absence of secondary sexual characters in the male, this new species seems especially similar to the East European *L. austriacus* (Verhoeff, 1937) [Zalesskaja, 1978: 181], but differs in the number of ocelli (3–5 in one row in *L. austriacus*), the presence of coxolateral spines on leg 15, the non-modified male legs 15 (prefemora 15 dilated, 15 VPm short and stout, with three apical teeth in *L. austriacus*), the absence of true spines on the female gonopod (gonopod segment II with a single distodorsal spine in *L. austriacus*).

Non-types are distinguished by their larger sizes (males, 10.4 (9.5–11.0); females, 12.2 (10.6–13.1)), the absence of a third (rudimentary) tooth on the female gonopod, the presence of a more strongly enlarged female gonopod segment I, and of 3–4 setiform spines on gonopod segment II (Fig. 85).

DISTRIBUTION. Only the terra typica.

ACKNOWLEDGEMENTS. The author is most grateful to Sergei I. Golovatch (Moscow) for his material, linguistic and editorial help, and constant guidance. Marzio Zapparoli (Viterbo, Italy) kindly provided constructive criticism of an advanced draft. Special thanks go to Sergei L. Esyunin (Perm), my supervisor. This work has been supported through grants 04–04–96000 and 04–04–96065 of the Russian Foundation for Fundamental Research.



Figs 82–94. *Lithobius simplis* sp.n., paratypes: 82 — head, dorsal view; 83 — male terminal tergite, dorsal view; 84 — female terminal tergite, dorsal view; 85 (non-type material) & 86 — female gonopods, ventral view; 87 — last three antennomeres; 88 — coxosternite; 89 & 90 — claws of legs 15 and 14; 91 & 92 — ocelli with Tõmõsváry's organ of male and female, respectively, lateral view; 94 — same, ventral view; 93 — male gonopod, ventral view. Scale bars: 0.1 mm.

Рис. 82–94. *Lithobius simplis* sp.n., паратипы: 82 — голова, дорсально; 83 — терминальный тергит самца, дорсально; 84 — терминальный тергит самки, дорсально; 85 (нетиповой материал) и 86 —гоноподы самок, вентрально; 87 — три последних членика антенны; 88 — коксостернум ногочелюсти; 89 и 90 — когти ног 15 и 14; 91 и 92 — глазки и темешвариев орган самца и самки, соответственно, латерально; 94 — то же, вентрально; 93 — гонопод самца, вентрально. Масштаб 0,1 мм.

References

Eason E.H. 1996. Lithobiomorpha from Sakhalin Island, the Kamchatka Peninsula and the Kurile Islands (Chilopoda) // Arthropoda Selecta. Vol. 5. Nos 3–4. P.117–123.

Eason E.H. 1997. On some Lithobiomorpha from the mountains of Kirghizia and Kazakhstan (Chilopoda) // Arthropoda Selecta. Vol. 6. Nos 1–2. P.117–121.

Farzalieva G.Sh., Zalesskaya N.T. 2003. On two remarkable species of lithobiid centipedes (Chilopoda: Lithobiomorpha: Lithobiidae) from the steppe of the southern Urals, Russia // Arthropoda Selecta. Vol. 11 (for 2002). No.4. P.265–269.

Farzalieva G.Sh., Zalesskaya N.T., Edgecombe G.D. 2005. A new genus and species of lithobiomorph centipedes (Chilopoda: Lithobiomorpha: Anopsobiidae) from eastern Kazakhstan // Arthropoda Selecta. Vol. 13 (for 2004). No.3. P.1–6.

Golovatch S.I., Wytwer J. 2003. A new genus and species of the millipede family Altajellidae from eastern Kazakhstan, Central Asia (Diplopoda: Chordeumatida) // Ann. Zool. Vol.53. Fasc.3. P.205–210.

Zalesskaja N.T. 1978. [Identification book of the lithobiomorph centipedes]. Moscow: Nauka. 212 pp. [in Russian].